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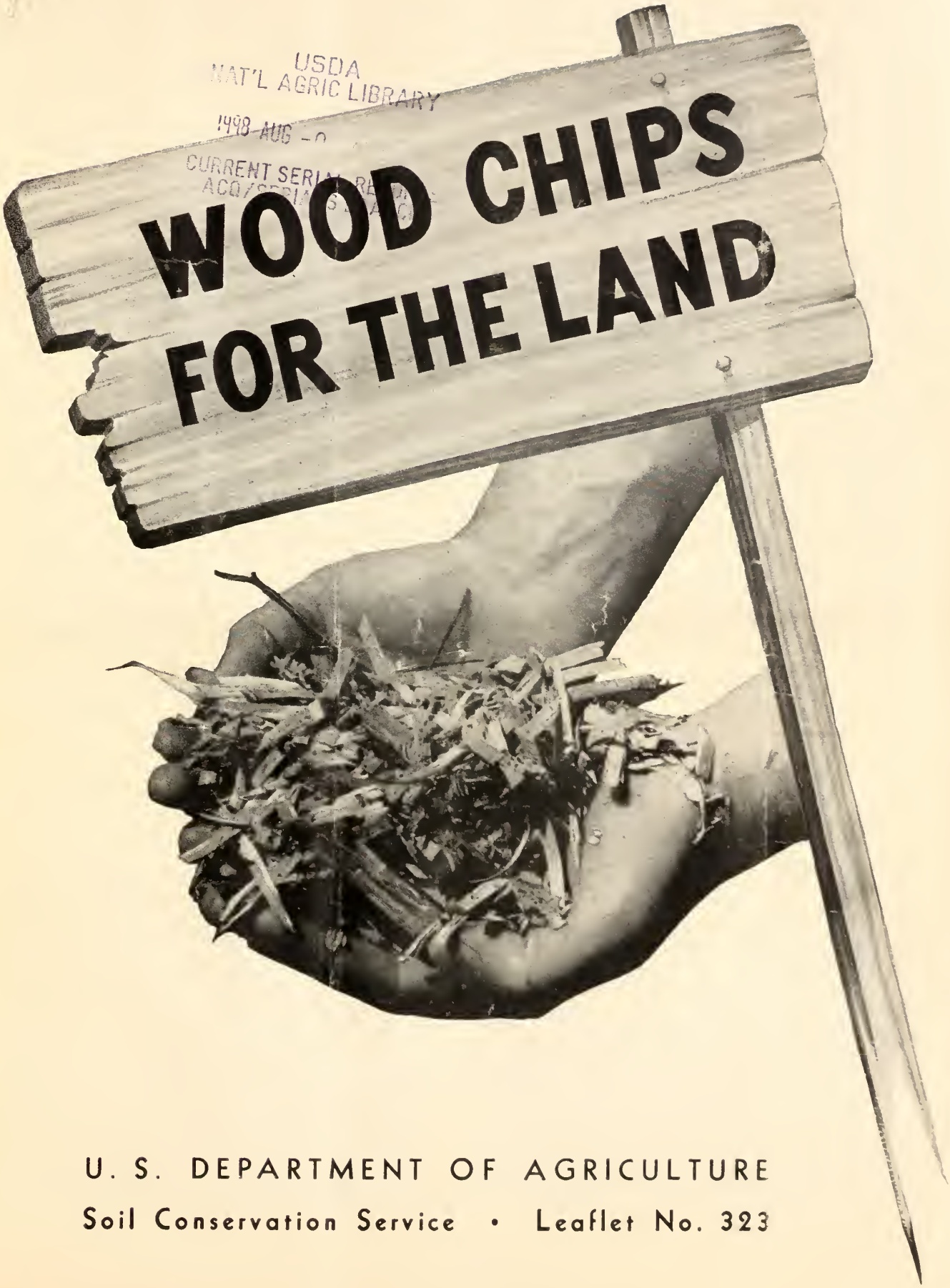
WOOD CHIPS FOR THE LAND



U. S. DEPARTMENT OF AGRICULTURE

Soil Conservation Service • Leaflet No. 323

WOOD CHIPS FOR THE LAND

By Arthur C. McIntyre, *regional forester, Northeastern Region, Soil Conservation Service*

FOR MANY YEARS farmers have used sawdust and shavings for cattle bedding, for poultry litter, and for mulching. More recently, they have found that wood in mulches and soil amendments helps improve soil structure and produces better crops. There are communities where farm demand for wood waste often exceeds supplies from mill and factory. This demand has put a price on sawdust and shavings.

As a result, several manufacturers have developed woodchipping machines that convert large pieces of wood from farm wood lot or mill into chips or shreds. Knives in these machines can be adjusted to produce the kind of chip a farmer wants—large or small, thin or shredded, for barn, yard, hen house, or field.

Moreover, the woodchippers are portable. They can be mounted on tractors, jeeps or trucks, or on trailers with their own power. They can be operated while slowly rolling through orchard, brush-clearing site, or wood lot. Few farm-land locations are too difficult for on-site operations of a woodchipper.

Generally speaking, a woodchipping machine consists of a power plant and a chipping head. The head is a disk or drum mounting three to six knives. Knives are either straight-edged or toothed; they can be used in combination, and set to cut at shaving thinness, or chunk coarseness. The operator feeds the machine through a throat opening on the chipping head. The pull of the knives, as chips are produced, draws the wood into the machine. Chips are discharged forcibly through an outlet flue that can be capped by a deflector, thus sending the material flying in a desired direction. Chips can be blown directly into trucks.

Ample power is necessary. When underpowered, the machines cannot produce uniform-sized chips. Owners failing to recognize this fact have been disappointed with machine performance.

The machines can handle all species of wood, green or dry. They readily chip slabs, brush, and pole wood, or an entire tree-length log up to 6 inches in butt diameter. Chips from hardwoods are much like those made from softwoods when the same knives and knife settings are used. Green wood goes through the machine easier, but seasoned material usually will make more uniform-sized chips. Two cords of wood per hour can be processed by the large chippers.

Using wood chips as an agricultural material is a fairly new idea. The chips now do farm jobs in much the same manner as other woody materials, such as sawdust and shavings. In addition, the woodchipping machine has proved itself of value to farm economy. It often accomplishes two or three jobs at once. For example, it can be used to dispose of wood-lot thinning:

Pile of baled shavings from nearby wood-working plants will be used to mulch areas around apple trees in Maine orchard. Their cost was one-third that of other mulch materials.

Chips for bedding 110 cattle were made from birch poles cleared for additional pasture on this New York dairy farm. In this way, the farmer saved over $5,000 during one winter.

Adequately powered at 65 horsepower, or better, the woodchipper can produce 2 cords an hour. The design pictured is a trailer unit. Others can be mounted on tractors and jeeps. They are readily moved over difficult terrain and are operable at most farm sites, as in wood lots, brushlands, and orchards. Deflector at top of the outlet is adjustable to put chips on desired locations.

the chips are then used as bedding for cows, and are later scattered on the fields as a woody manure to improve soils.

Machines have fulfilled the twofold purpose of getting rid of orchard prunings and supplying a valuable mulch for fruit trees. New pasturage has been cleared with the aid of the woodchipper and the resultant chips used for litter in nearby poultry houses.

Wood chips are low in cost. Under favorable conditions, they can be produced for about $5 a ton, including costs of labor and materials, and maintenance and depreciation of the machine. This compares favorably with costs of other material used for bedding, litter, and mulch.

A New York dairyman reported that he saved $5,000 the first winter he replaced straw with wood chips under his 56 milkers and 54 head of other stock. Savings of $180 per acre in 5 years were noted by an apple orchardist who mulched with chips instead of straw. Poultrymen have found that small wood chips make desirable litter.

A woody mulch on blueberry bushes has doubled production over that obtained with straw, and tripled yields obtained with no mulch. During a recent dry summer, a Maine apple grower found that 65 percent of the apples from wood-mulched trees measured more than 2½ inches in diameter. Only 30 percent of the apples from unmulched trees had reached that size.

In the long run, the increasing use of wood materials in farming will perform a real service for American agriculture and can assist in adding greater profit to farm operations. When they are returned to the land in the form of mulches and soil amendments, they improve its texture and organic qualities. Almost one-third of the Nation's farmers are handy to wood lots. There are in farm woodlands tremendous quantities of unmarketable pole wood that could be used. At mills and factories several million cords of slab wood and trimmings are discarded each year. This material could be used on the land.

Agricultural application of the vast reservoir of material in the Nation's wood lots would approach the ideal of woodland management—the complete and sustained use of all tree crops grown—selecting for market that which is salable and utilizing the tops, cull trees, and weedings for chips on the land.

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Large-throated woodchippers will make uniform sized fragments from tree-length logs having butt diameters up to 6 inches.

FOR CATTLE—

DAIRYMEN have recognized that wood materials make excellent bedding. While sawdust and shavings serve well as bedding, they are often hard to get and costly to load and haul. Chips made of farm wood waste are a good substitute, can be manufactured on most farms. handled at low cost, stored or used immediately. Chips can be poured or moved with suction or blower pipes. Dry wood chips can be stored in bins and fed through a hopper directly into a wheelbarrow for placing in stall or gutter. Woody manure handles ideally with a spreader.

Some farmers prefer dry wood chips for bedding but fresh-cut green wood also serves. Green wood chips may be dried mechanically. But if air-dry chips are desired, pole wood should be air-seasoned before it is chipped. Pole and limb wood cut in the spring and left untrimmed will be dried out by fall. Slab wood makes good bedding. At some mills, slabs are run through chippers and the chips mixed with sawdust. Brushwood does not make a good bedding or litter.

For pen stabling, coarse chips are superior to any

Wood-chip bedding used in this Delaware dairy barn stays under cow, does not mat, and effectively takes care of manure.

POULTRY, TOO

other material now used. They remain dry and springy after prolonged use. They do not mat as does straw and hence are easily removed.

Bedding quantities depend on the amount of manure and the capability of the bedding to absorb it. Large wood chips adsorb less moisture than do small chips or sawdust. Six pounds of coarse, dry sawdust furnishes clean bedding for 1 cow-day. To get the same results, about 10 pounds of chips should be used. One cord of pole wood provides enough chips for 1 animal-year.

Although sawdust is used for chicken litter, it has a tendency to pack. Shavings make a good litter and are used by many poultrymen when available. Uniformly small wood chips—one-eighth to one-fourth inch in width and thickness—also have the desirable qualities of a good litter. They do not break up and pack readily, and remain dry and clean. Dust and manure readily sift or fall through to the floor; the chips remain constantly on top, maintaining cleanliness. Chips are excellent for build-up litter.

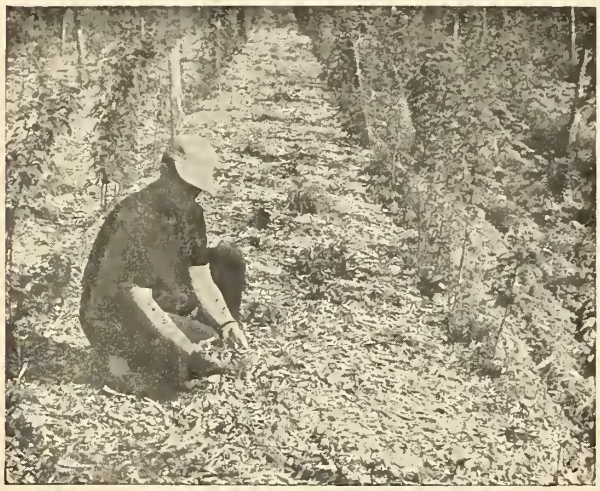
Dry, dust-free, and scratchable poultry litter was made by custom woodchipper from selective cuttings in the wood lot.

Young stock exercise on footing of chips made from dry slab wood. The material remains dry and springy even after rain.

RICHER SOILS—

Tractor-mounted woodchipper at work in a garden.

Fresh wood chips on pea patch effectively control weeds.



Better raspberry yields are possible with wood mulches.

WOOD IS ORGANIC. It creates humus when allowed to rot in or on the soil. The organic-matter content of soils can be maintained or built up with wood. On abandoned farm land grown up to brush, 30 tons of stems per acre were plowed and disked under. This land was successfully cropped to vegetables and grains the same year. In field tests, cultivation with 20 tons of chips per acre, plus fertilizer, produced higher yields than where 12 tons of manure were used.

Like other mulches, wood chips protect soils from erosion, stabilize soil temperatures, and prevent moisture losses. They save on labor costs by controlling weeds. Wood chips have their own specific merits. They are not readily blown or washed away and do not create a fire hazard as does straw or hay. Sized to fit the need, chip mulches last longer than other kinds and do not favor insects and rodents.

When wood in any form is permitted to decay in soil, it invariably improves the soil's usefulness. It is a soil conditioner, but it should not be considered a fertilizer.

Because wood is high in lignin, it will produce more humus than most other organic matter such as green manures or stubbles. In its presence, soil tilth, moisture, and aeration become increasingly favorable. Farmers plowing wood into heavy soils will find them more workable thereafter. Adding chips to light, sandy soils tend to give them body and the ability to hold water.

Some people still believe that wood "makes soils sour." This is not the case. The end product of decomposition is alkaline, like wood ashes. For example, a Maine farmer who applied hardwood sawdust to his fields for 3 years changed their pH factor from 5+ to 6.3.

Microbes, active in the wood-rotting process, consume nitrogen while they work. This causes a temporary loss for growing plants. But this loss can be overcome by using more nitrogen in the fertilizer. That is, to offset the increased demand for nitrogen, both wood-mulched and wood-amended soils should be treated with supplementary nitrogen in the usual fertilizer.

Wood chips do not require as much nitrogen while decaying as does sawdust. Fifty pounds of ammonium sulfate per ton of chips is adequate. Farmers have found that 150 pounds of ammonium sulfate or 100 pounds of ammonium nitrate per ton of dry sawdust is needed. Applying this nitrogen in two or more installments reduces possible loss from leaching.

For mulching, a rule-of-thumb figure is 27 cords of chips per acre for each inch in thickness. Chips vary in weight, depending on size. Fine chips may weigh 17 pounds per cubic foot; coarse chips as much as 24 pounds.

AND CROPS

Following are recommendations for field use of chips, including shavings and sawdust:

Field soil improvement: As much as 20 tons of chips or sawdust can be used at one time. They can be disked or plowed into the soil following application of fertilizer. They can be used during any crop rotation. If a legume is used, the wood should be plowed in before seeding, when less nitrogen is required. If wood chips are to be used to build up the humus of worn-out soils about 10 tons per acre should be applied every year the soil is worked. Twenty or more tons of woody manures can be applied at any one time. If chip bedding is used at the rate of 10 pounds per animal-day, the manure should be supplemented with about 50 pounds of sodium nitrate per ton of manure.

Chip mulch on fruit trees: Use enough chips to give a 5- to 7-inch covering. Use locally recommended fertilizer applications supplemented by extra nitrogen. Less nitrogen is required when wood is used for mulch than when it is plowed into the soil.

A chip mulch reduces injury to "drops." Fruit can be more readily found and harvested in a chip mulch than in grass or straw mulches.

Chip mulch on berries: A 6-inch woody mulch on blueberries has given excellent results. A 7–7–7 fertilizer, used at the rate of 1 ounce for each year of the plants' age not exceeding 8 ounces, has provided enough nitrogen.

Blackberries and raspberries respond to mulching. A 4- to 7-inch mulch effectively curtails weed growth.

A 3- to 5-inch mulch on strawberries is recommended. Runners will root in a sawdust mulch. Acceptable rooting will not occur in a coarse chip mulch.

Vegetables and flowers: Apply 2 to 3 inches of sawdust or equivalent amounts of wood chips. Mulch can be spaded in and thus, year by year, build up soil organic matter. In general, where this mulch is used, you should double the amounts of nitrogen applied in fertilizer. For instance, if a 6–8–4 is recommended with no mulch, use 12–8–4 following wood mulching.

Farm roads and field lanes: Traffic sections of fields, orchards, and farmyards tend to suffer from dust, compaction of soil, rutting, puddling, and erosion. Paving with generous applications of wood chips will greatly help to control and prevent such conditions. An excellent roadbed can be built with wood chips.

Special note: Nitrogen deficiencies can be noted in crops. Yellowing of leaves and slow growth are typical signs. In small gardens or berry patches, side dressing with a nitrogen fertilizer will offset initial deficiencies.

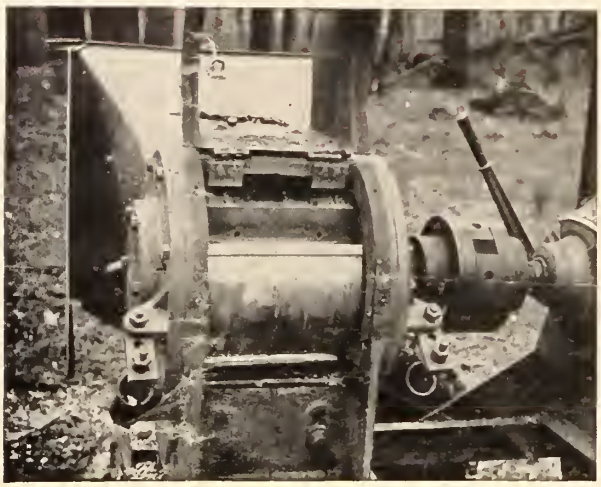
Chipped orchard prunings make mulch for trees—paving for lanes.

Four bales of shavings per tree produced better Maine apples.

Shavings from a box factory made strawberry cultivation easier.

PRACTICAL WOOD CHIPPING

Montana tree nurserymen apply 25 tons of wood chips per acre.



Woodchipper head adjusts to control size of chip.

Sawmill slabs being chipped directly into Vermont dairy barn.

AS SUPPLIES of sawdust, shavings, and similar wood-shop refuse have become less available and more costly, farmer interest has been focused on woodchipping machines. Unit prices range from $700 to $4,000. Group ownership among farmers reduces individual costs and provides maximum usage. Woodchipping units have been purchased by soil conservation districts for the use of cooperators. Custom woodchipping services operate in some areas.

Chipping hints: Certain rules of thumb will aid woodchipping operations:

Feed the machine wood that is free of dirt, gravel, stones, and other abrasive substances, to prolong the life of the blades.

Prepare the chipping site carefully, piling poles and logs with butts toward the machine, to save time. The machine chips with spectacular speed.

In estimating quantities it may be helpful to know that wood loses about one-fourth of its initial weight while seasoning; 1 cord of pole wood will make about 2 cords of chips; 1 cord of wood weighs about 2 tons; 1 cord of chips weigh about 1 ton.

In figuring chipping costs, about one-half are chargeable to the value of wood and the labor of preparing it for the chipper; the other half account for labor in actual chipping, plus machine operation and maintenance.

Although it is now well established that wood chips and chipping devices have farm values, their possibilities have only begun to be explored. Wider experience is needed for discovery of new uses and greater values. No value, however, is likely to exceed their value as a mulch, in manures, and as a soil amendment, in maintaining and improving farm land.

For further information: Get in touch with the nearest forester, soil conservationist, county agent, or soil conservation district.

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